Coupling of drill anchors

The invention relates to a coupling of drill anchors with a sleeve with an inside thread and with two anchor pipes which bear an outside thread and which are screwed into the sleeve from opposing sides.

These couplings are known.

The problem in these couplings is that the flushing medium (air or water) which flows through the cavity of the anchor pipes while drilling and the setting mass (for example cement mortar) which is pressed through the cavity of the anchor pipes toward their front end which is held in the borehole after completion of the borehole can escape in the area of known couplings. In this way losses of flushing media occur escape [sic] and in the case of setting mass with leaky couplings plugs of setting mass form which prevent complete filling of the borehole around the drill anchor.

The object of the invention is to make available a coupling of the initially mentioned type which even under the loads which occur during drilling (rotary-impact movement of the drill anchor) is and remains reliably tight.

This object is achieved as claimed in the invention with a coupling which has the features of claim 1.

Preferred and advantageous embodiments of the coupling as claimed in the invention are the subject matter of the dependent claims.

Since in the coupling as claimed in the invention the ends of the anchor pipes which have been screwed into the sleeve fit into the annular rib which is provided in the sleeve, forming a

seal, the escape of flushing medium and/or setting mass in the area of the coupling(s) is prevented.

If according to one preferred embodiment of the coupling as claimed in the invention it is provided that the ends of the anchor pipes held in the sleeve directly adjoin one another with their front surfaces, and preferably it is also provided that the front surfaces of the outer pipes adjoin one another to form a seal, additional sealing in the area of the coupling is ensured since between the ends of the anchor pipes located in the coupling the flushing medium and/or the setting mass cannot escape. In addition, this measure of the invention has the advantage that the rotary-impact force which warps the drill anchor when drilling a hole in rock is less of a problem since transmission takes place directly from anchor pipe to anchor pipe.

Other details, features and advantages of the coupling as claimed in the invention result from the following description of the embodiment which is shown by way of example in the drawings.

Figure 1 shows a coupling partially in a section,

Figure 2 shows the adjoining ends of anchor pipes (without the sleeve) enlarged and partially cutaway,

Figure 3 shows a sleeve in a lengthwise section,

Figure 4 shows detail IV from Figure 3,

Figure 5 shows an anchor pipe, partially in a section,

Figure 6 shows detail VI from Figure 5,

Figure 7 shows enlarged a detail of the coupling in the area of the annular rib of the sleeve and

Figure 8 shows another embodiment of a coupling as claimed in the invention with the sleeve.

As shown in Figure 1, a coupling consists of a sleeve 1 and two anchor pipes 2 which are held with their ends 8 in the sleeve 1.

The sleeve 2 has two internally threaded segments 5 which are separated from one another by an annular rib 4 which projects to the inside; the threads of the segments run in the same direction. On their outer surface the anchor pipes 2 bear an outside thread 3 which matches the inside thread 5 of the sleeve 1.

The anchor pipes 2, preferably on the two ends 8, have a segment without an inside thread which extends away from the front surface 6 of the anchor pipe 2. This segment without an inside thread in the embodiment is made with a cylindrical outside surface 12. The front surfaces 6 of the anchor pipes 2 which are made annular can have a chamfer 22 and 20 inside and/or outside (Figure 6).

The annular rib 4 which is located in the lengthwise middle of the sleeve 1 has a cylindrical inner end surface 10 and two side surfaces 16 which are essentially normal to the axis 7 of the sleeve 1 and which on either side of the annular rib 4 with a radius (curvature) pass into the segment 14 of the inside surface of the sleeve 2, that is, the segment without an inside thread.

The situation for an assembled coupling is shown in Figure 7. It is apparent that the anchor pipes 2 with their thread-free ends 8 are located within an annular rib 4, the cylinder surfaces 12 on the ends 8 of the anchor pipes 2 adjoining the inner end surface 10 of the annular rib 4, forming a seal (the gap shown in Figure 7 between the surfaces 10 and 12 in practice is not present and is shown only for the sake of clarity).

Figure 7 also shows that the annular front surface 6 of the ends 8 of the anchor pipes 2 directly adjoin one another to form a seal.

The width B of the annular rib 4, therefore the length of the cylindrical inner end surface 10 of the annular rib 4, which length is measured in the direction of the axis 7 of the sleeve 1, is roughly as great as the sum of the length A of the thread-free segments 12 on the ends 8 of the anchor pipes 2, which length is measured in the direction of the axis, i.e. in the lengthwise direction of the anchor pipes 2. This results in that a sleeve 1 cannot be screwed too far onto the anchor pipe 2 since the shoulder on the end of the cylinder surface 12 of the anchor pipe 2 strikes the side surface 16 of the annular rib 4 when the front surface 6 of this anchor pipe 2 is located roughly in the middle of the lengthwise extension of the rib 4. Thus it is ensured that there is an essentially symmetrical structure of the coupling as claimed in the invention consisting of the sleeve 1 and two anchor pipes 2 which are held (screwed) in it.

In the embodiment of the coupling as claimed in the invention which is shown in Figure 8, in the cylinder surface of the annular rib 4 which points to the inside there is an annular groove 20 in which an annular seal 21 of elastic material (O-ring) is inserted.

The anchor pipes 2 which are screwed into the sleeve 1 with their chamfers 20 on the outside edge of the front surfaces 6 which also adjoin one another in this embodiment adjoin this seal 21 so that the seal between the two anchor pipes 2 is further improved in the area of the coupling.

It should be pointed out that in Figure 8 the annular seal 21 is shown "idealized", therefore with its original round cross sectional shape. In fact, in the assembled state of the coupling it will be deformed in its part which projects over the inside surface of the annular rib 4

into a triangular cross sectional shape according to the outside chamfers 20 on the front surfaces (6) of the anchor pipes 2.

The cross sectional shape of the annular seal 21 need not be round. For example, the annular seal can have a polygonal cross sectional shape (rectangular or quadratic). It is also conceivable for the part of the annular seal 21 which projects over the inside surface of the annular rib 4 to have a wedge-shaped cross sectional shape which tapers radially to the inside.

In summary, one preferred embodiment of the invention can be described as follows:

A coupling of drill anchors has a sleeve 1 with an inside thread 5 and two anchor pipes 2 which are provided with an outside thread 3 and which have ends 8 which are screwed into the sleeve 1. The sleeve 1 in its lengthwise middle bears an annular rib 4 with a cylindrical inner end surface 10. The ends 8 of the anchor pipes 2 fit into this annular rib 4 to form a seal, for which they are made with cylindrical, thread-free peripheral surfaces 12. In order to improve the tightness of the coupling and to make the transmission of impact energy from the anchor pipe 2 to the anchor pipe 2 experience less loss, the annular front surfaces 6 of the anchor pipes 2 adjoin one another in the area of the annular rib 4 to form a seal. Thus, a coupling for drill anchors is made available which is free of leaks and which prevents the escape of the flushing medium and/or setting mass.